ZOOLOGY

Sharks and stripes for never

With *Jaws* and all its relatives cruising the coasts of North America, it may be time to don striped bathing suits. An idea has been kicking around for some time now that sharks abhor anything in stripes because they fear the striped sea snake, whose venom is one of the most virulent of all known biotoxins. Sea snakes galore have been found in the bellies of sharks, but rarely has the banded sea snake.

But is there any scientific basis to this myth? William Dunson, a Pennsylvania State University biologist, plans to find out. He will be serving for the second time as chief scientist aboard the research vessel Alpha Helix—a floating laboratory operated by the Scripps Institution of Oceanography and funded by the National Science Foundation. On a previous trip to Australian waters, Dunson helped catch hundreds of sea snakes, often with bare hands. This time he'll dive in the Visayan Sea off the Philippines, where banded sea snakes abound, and try to catch sharks to see whether he can find any banded sea snakes in their stomachs. He will also experiment with baited and unbaited banded and plain poles to see whether the sharks consistently avoid the banded variety, no matter what the bait.

Hitting termites in the gut

Environmentalists would like to see the noxious pesticides used against termites replaced by some kind of biological control. Such a control may now have been found by John A. Breznak and his team of microecologists at Michigan State University. It would consist of altering nitrogen-fixing bacteria in the gut of termites.

Breznak and his team have grown bacteria from the guts of termites in the test-tube. They have also shown that the bacteria are able to fix nitrogen from the atmosphere. Consequently they believe that the bacteria probably help keep termites alive by providing them with nitrogen, since nitrogen in the air is transformed into ammonia, a necessary constituent of proteins, and wood, the principal food of termites, contains little nitrogen.

If their theory is correct, it might be possible to control termites by modifying the activity of their nitrogen-fixing bacteria. One approach that the Michigan group visualizes would be to obtain mutants of the bacteria with excessive nitrogen-fixing activity. If suspensions of such mutants could be sprayed on infested timbers when the insects feed, they might be able to kill the termites by producing toxic levels of ammonia.

How fish keep from freezing

Automobile antifreeze is a household term. Not so fish antifreeze. Yet during the past five years scientists have found that cold-water fish indeed produce proteins in their blood to keep them from freezing. One fish antifreeze protein was isolated and analyzed for amino acid content in 1972, and another in 1974. Now two more have been isolated and analyzed by J.A. Raymond and his co-workers at the Scripps Institution of Oceanography.

Raymond and his colleagues caught two species of Alaskan fishes. They purified protein fractions from the fishes' blood having freezing-point depressing activity. Then they analyzed the proteins for amino acid content and compared the contents to those of the two other isolated fish antifreezes.

The most noticeable similarity between all four antifreezes was a high content of the amino acid alanine, Raymond and his colleagues report in the July JOURNAL OF EXPERIMENTAL ZOOLOGY. They speculate on how this high alanine content might create an affinity between an antifreeze molecule and an ice crystal, thereby keeping the crystal from growing.

PHYSICAL SCIENCES

Taking a count of quarks

In the latest high-energy particle physics, when projectile meets target or two accelerated beams collide, a fair number of the new particles produced in the collision come off in directions transverse to the way the original beams were going. These transverse particles are a topic of high interest because they carry information about the most intimate details of the interrelations and structures of the colliding objects.

One of the things that is needed is a way of predicting what is likely to come off transversely in a given collision. In the Aug. 11 PHYSICAL REVIEW LETTERS Alan Chodos and Jorge F. Willemsen of the Massachusetts Institute of Technology present a method based on simple quark counting for the collision of a proton with a beryllium-9 nucleus.

Their rule takes into account the kinds of quarks brought into the reaction by projectile and target (and makes allowances for the variation according to whether the incoming proton strikes a proton or a neutron in the beryllium nucleus), the new kinds of quarks that have to be created in the reaction to make the transverse particles that come out and the probabilities of making and combining them. Under certain simplifying assumptions it predicts what comes out.

If the incoming beam were pions instead of protons, the method would give a radically different prediction because the pion brings in different quarks from those of the proton. Chodos and Willemsen suggest precisely this application as a test of the generality of the method. If it is general, its success would hint at new phenomena, "a dynamical regime in which mechanisms different from those usually considered are likely to play an important role."

How tight was my helix twisted?

Polymeric molecules are often kinky. Perhaps the most famous twisted molecules are DNA and RNA, the famous double helices that took so much arduous effort to unravel.

One of the things a molecular biologist or biophysicist wants to know about a flexible polymer is how tight you can kink it. How sharp an angle can it assume between one monomer and the next; what is its effective radius of curvature, for which the technical term is "persistence length"? In the Aug. 11 PHYSICAL REVIEW LETTERS G. Maret, M. von Schickfus and K. Dransfeld of the High Field Magnet Laboratory of the Max Planck Institute for Solid-State Research in Grenoble, France, present a method for measuring it with magnetic fields.

A biological system with a magnetic imbalance—and that can include various things from nucleic acids to whole cells—will orient itself in a certain direction in a magnetic field. Such orientation for whole cells has been reported, the present researchers point out, at fields around one tesla and for polystyrene solutions in fields of 1.7 tesla. Availability of fields up to 14 tesla enables the Grenoble group to orient such things as DNA and synthetic nucleic acids. From the orientation they can determine the persistence length and how it varies with temperature and other factors. They say it's a new and better way.

Superconducting enzymes?

Submission of an aqueous solution of the enzyme lysozyme to a magnetic field of 600 gauss produces superconducting regions in the solution, Herbert Fröhlich of the University of Liverpool reported to the Dielectrics Society (NATURE 256:371; PHYSICS LETTERS 53A:129). Apparently what happens is similar to the Meissner effect in metals, and its occurrence in lysozyme might lend physical respectability to the oft-claimed physiological effects of magnetic fields.